COMMONWEALTH OF AUSTRALIA.

PATENT SPECIFICATION

128,026

Application Date: 17th Aug., 1945. No. 22,597/45.

Under International or Intercolonial Arrangements.
(United States of America, 30th October, 1944.)

Applicant (Assignee of Actual Inventor) ... BENDIX AVIATION CORPORATION.

Actual Inventor ... ... HAROLD LOUIS FRICK, Michigan, U.S.A.

Complete Specification open to public inspection --Section 121 (5) 31st October, 1945.

Application and Complete Specification ... Accepted, 17th June, 1948.

Acceptance Advertised (Sec 50 ... 1st July, 1948

Classes 69.8 ; 69.6 ; 68.8.

Drawing attached.

COMPLETE SPECIFICATION.

"Multi-impulse blower."

We, BENDIX AVIATION CORPORATION, a corporation of Delaware, carrying on business as Manufacturers at 4855 Fourth Avenue, Detroit, 1, Michigan, United States of America, hereby declare this invention and the manner in which it is to be performed to be fully described and ascertained in and by the following statement:

This invention relates to blowers, and more particularly to multi-impulse blowers.

Broadly the invention comprehends a blower including a case having an inlet and an outlet. The structure of the case is such as to provide a fluid channel so contoured that fluid in the channel when energized by an impeller mounted for rotation in the case is constantly circulated through recurring vanes on the impeller as it travels from the inlet to the outlet with gradually increasing pressure.

The structure of the instant invention resembles a centrifugal type blower in that it has only one moving part, the impeller, and is characterized in that it has no engaging surfaces or valves adapted to serve as fluid seals. The power to drive the apparatus increases as the head increases, and in this respect it resembles a positive displacement pump or blower.

An object of the invention is to provide an efficient multi-impulse blower.

Another object of the invention is to provide a multi-impulse blower having the same [illegible] number of parts each of simple structure.

Another object of the invention is to provide a multi-impulse blower having a fluid channel gradually decreasing in area from the inlet to the outlet of the blower.

Yet another object of the invention is to provide a multi-impulse blower including a case having an inlet and an outlet, and an impeller enclosed in the case having such relation thereto and to the inlet and outlet as to provide a fluid channel of gradually decreasing area from the inlet to the outlet.

2684—16/7/48.—155.—Price 1s. 6d. post free.

Other objects and advantages of the invention will appear from the following description when taken in connection with the accompanying drawings forming a part of this specification, and in which

Figure 1 is a sectional view through the case normal to the axis thereof

Figures 2, 3 and 4 are fragmentary cross-sectional views illustrating a gradual decrease in the area of the fluid channel

Figure 5 is a vertical sectional view illustrating a modification of the structure; and

Figures 6, 7 and 8 are fragmentary sectional views illustrating the flow channel

Referring to the drawings for more specific details of the invention, 10 represents a stationary case characterized in that the peripheral wall thereof is voluted. The case has an inlet 12 at the greatest width of the voluted wall, and an outlet 14 at the smallest width of the voluted wall. The inlet and outlet are in close proximity, and provide in conjunction with one another a partition 16 having an arcuate face 18.

A shaft 20 extended through the case and adapted to be driven by any suitable source of power has keyed thereon within the case an impeller 22 having spaced vanes or blades 24. The periphery of the impeller wipes across the arcuate face 18 on the partition between the outlet and inlet of the case so as to more effectively separate the inlet and the outlet.

The relationship of the shaft and hence the impeller to the case is such as to provide in conjunction therewith a fluid channel 26 characterized in that it is gradually reduced in cross-sectional area from the inlet of the case to the outlet thereof.

A modification of the invention is illustrated in Figures 5 to 8. In this modification a stationary case indicated generally at 102 includes an end plate 104 and an end plate 106 spaced apart as by a ring 108, and bolts 110 passed through the plates and ring serve to secure the component parts of the case together.

The end plate 104 has a concentrically disposed hub 112, and suitable bearings 114 and 116 are fitted in the hub. A shaft 118, supported for rotation on the bearings 114 and 116 and adapted to be driven by any suitable power, has keyed thereon within the case an impeller 120 having spaced vanes or blades 122. The end plate 106 has an inlet 124 and a spaced outlet 126 and a core 128 characterized in that it gradually increases in cross-sectional area from a point opposite the inlet to a point opposite the outlet so as to provide a fluid channel 130 gradually decreasing in cross-sectional area from the inlet of the case to the outlet thereof.

In both the preferred and modified embodiments of the invention, fluid entering the blower through the inlet is received in the entrances of the impeller vanes and is then circulated between the vanes and in the channel, as indicated by arrows in Figures 2, for approximately seven-eighths of a turn before reaching the discharge.

Due to centrifugal force, the direction of flow of the fluid is through the vanes to the periphery of the impeller where the fluid enters the stationary channel. Because of the contour of the channel, the fluid is directed back into the entrances of the impeller, and, accordingly, additional energy is imparted to the fluid. Thus the path of flow of the fluid is that of a spiral gradually tapered from the inlet to the outlet, and during this flow the fluid is successively energized by repeated passage through the vanes of the impeller.

The circulation of the fluid through the large number of vanes of the impeller is continuous while the fluid is transmitted from the inlet to the outlet. Thus a multi-stage effect is produced with a single impeller.

In the so-called turbine pumps thus far produced to handle liquids or incompressible fluids, the channel section has remained uniform through its length. In the handling of compressible fluids, such as air, gas, etc., it is proposed to make the channel section follow the relations for a perfect gas; i.e.,

$$\text{Pressure} \times \text{Volume} = \text{Temperature} \times K$$

$$\text{Volume} = \frac{\text{Temperature} \times K}{\text{Pressure}}$$

Accordingly, as the gas is compressed by succeeding passages between the impeller vanes, the cross-section of the channel will be reduced in proportion to the change in volume of the gas.

While this invention has been described in connection with certain specific embodiments, the principle involved is susceptible of numerous other applications that will readily occur to persons skilled in the art.

Having now fully described and ascertained our said invention and the manner in which it is to be performed, we declare that what we claim is:—

1. A multi-impulse blower comprising a case having an inlet and an outlet and an

impeller so arranged in the case as to provide in conjunction therewith a voluted fluid channel decreasing in cross-sectional area from the inlet to the outlet.

2. A multi-impulse blower comprising a case having an inlet, an outlet and a fluid channel gradually decreasing in cross-sectional area from the inlet to the outlet, and an impeller juxtaposed to the channel.

3. A multi-impulse blower comprising a case having an inlet an outlet juxtaposed to the inlet, and a fluid channel gradually decreasing in cross-sectional area from the inlet to the outlet and an impeller having spaced radially disposed vanes juxtaposed to the channel.

4. A multi-impulse blower comprising a case having an inlet, an outlet juxtaposed to the inlet and providing in conjunction therewith a partition extended into the case, an impeller in the case providing in conjunction therewith a fluid channel gradually decreasing in cross-sectional area from the inlet to the outlet, and vanes on the impeller for co-operation with the channel.

5. A multi-impulse blower comprising a case having an inlet and an outlet, and an impeller therein providing in conjunction with the case a voluted fluid channel gradually decreasing in cross-sectional area from the inlet to the outlet.

6. A multi-impulse blower comprising a case having an inlet and an outlet juxtaposed thereto with the wall therebetween defining a partition having an arcuate face, an impeller in the case providing in conjunction therewith and with the arcuate face a voluted fluid channel gradually decreasing in cross-sectional area from the inlet to the outlet, and radial vanes on the impeller cooperating with the channel.

7. A multi-impulse blower comprising a case having an inlet and outlet and a vaned impeller arranged in the case and providing therewith a voluted channel which decreases in cross-sectional area from the inlet to the outlet, the fluid being constantly circulated through recurring vanes on the impeller as it travels from the inlet to the outlet and being successively energized by repeated passage through said vanes.

8. A multi-impulse blower comprising a case having an outlet and an inlet and a vaned impeller eccentrically mounted in the case and defining therewith a channel decreasing in cross-sectional area from the inlet to the outlet.

9. A multi-impulse blower comprising a case having an inlet and an outlet, a vaned impeller mounted in said case and a core carried by the case and located in the channel formed by the case and impeller, said core having a cross-sectional area gradually increasing from a point opposite the inlet to a point adjacent the outlet whereby the channel decreases in cross-sectional area from said inlet to said outlet.

10. A multi-impulse blower substantially as described in connection with the accompanying drawings.

Dated this fourth day of June, 1948.

BENDIX AVIATION CORPORATION,

By its Patent Attorneys,

SPRUSON & FERGUSON.

Witness—M. Murray.

Printed and Published for the DEPARTMENT OF PATENTS, COMMONWEALTH OF AUSTRALIA, by Victorian Railways Printing Works, North Melbourne, Victoria.

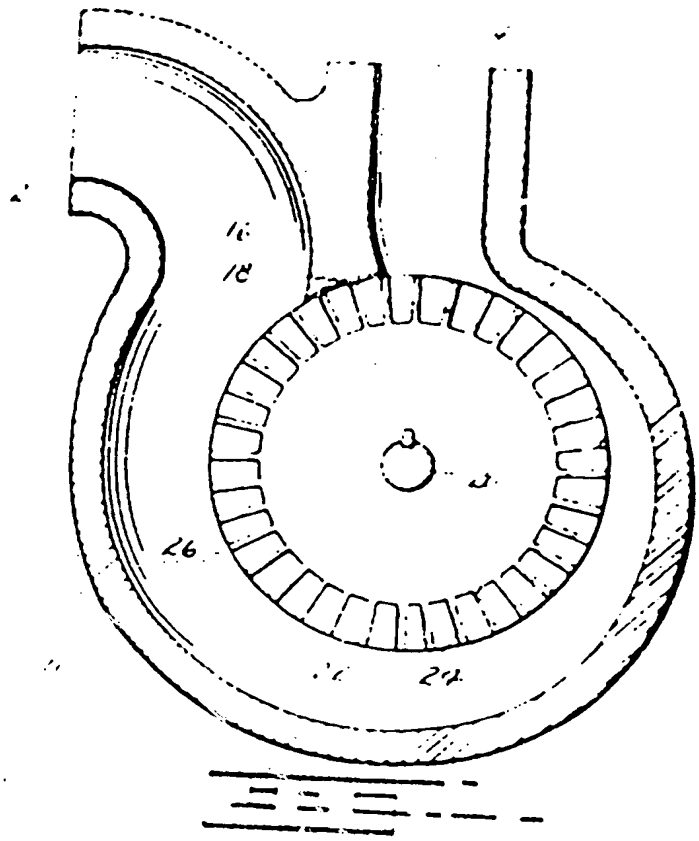

Fig. 1

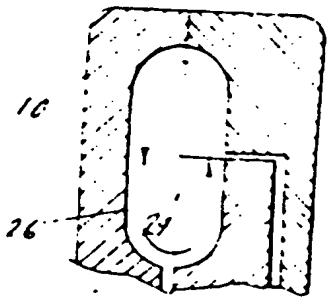

Fig. 2

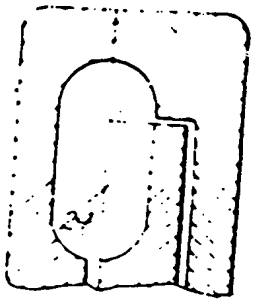

Fig. 3

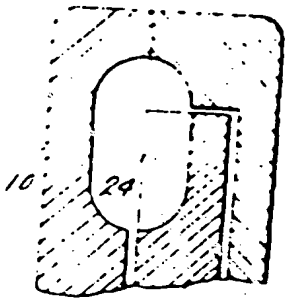

Fig. 4

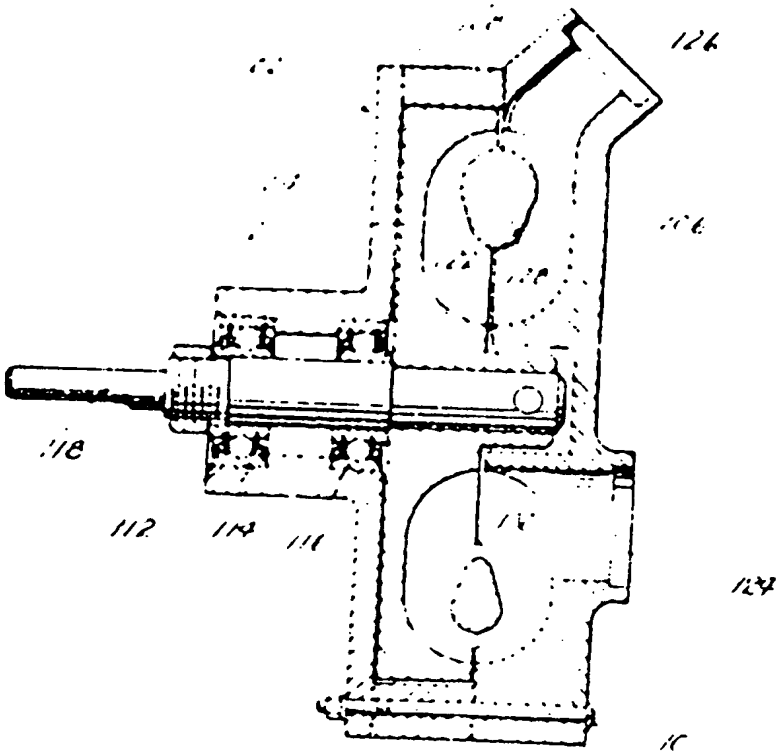

FIG. 5

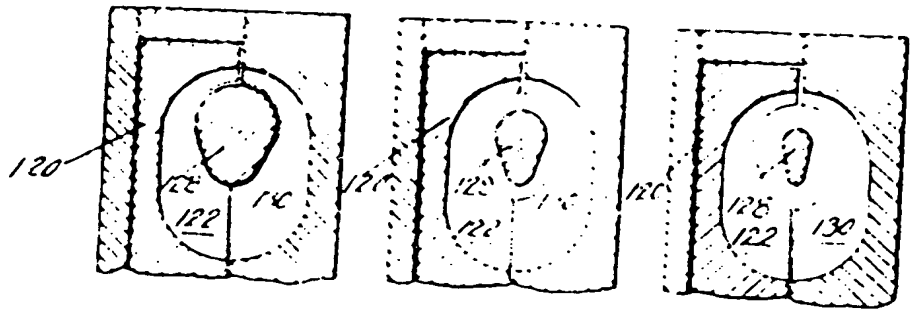

FIG. 6 FIG. 7 FIG. 8